## SONY

# 3CCD Color Video Camera

#### Instructions for Use Page 2

Before operating this unit, please read this manual thoroughly and retain it for future reference.

DXC-950P Power HAD





#### Owner's Record

The model and serial number are located at the bottom. Record the model and serial numbers in the spaces provided below. Refer to them whenever you call upon your dealer regarding this product.

Model No. DXC-950P	Serial No	
Model No. DXC-950P	Serial No	

## WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

#### For the customers in the U.S.A.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

## Table of Contents

Features	6
Precautions	8
Safety Precautions	9
Operating Precautions	12
Typical CCD Phenomena	
Location and Function of Parts and Controls	
Front Panel/Top Panel/Bottom Panel	14
Rear Panel	
Installation	
Mounting the Lens	18
Mounting a Microscope Adaptor	
Mounting on a Tripod	
Attaching to a Wall or Ceiling	
Basic System Connection	
Connecting to Video Equipment With	
Composite Video Input Connectors	21
Connecting to Video Equipment With	
RGB or S-Video Inputs	23
Connections for a Multi-Camera System	24

Connecting to a Remote Control Unit	25
Connecting to the RM-C950 Remote Control Unit	25
Connecting to the RM-930 Remote Control Unit	
Connecting to a Camera Control Unit	
Connecting to a Printer	. 28
Connecting to a Computer	29
Connections for Long Exposure Shooting	30
Connecting to a Flash Unit	
Changing the Camera Settings	
Menu Operation (Changing the Settings)	
Menu Items	
Menu Settings	
Initial Settings	47
Shooting	
Basic Shooting Procedure	
Adjusting the White Balance	
Adjusting the Picture Tone in a	
Multi-Camera System	52
Specifications	
Recommended Equipment	55

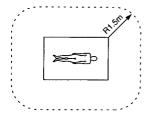
## Symbols on the unit

Symbol	Location	This seems to the
Syllibol	Location	This symbol indicates
Type B	Bottom	Type B equipment classified in accordance with IEC Publication 601-1 Safety of medical electrical equipment.
<u> </u>	Тор	This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.
	Rear panel	This symbol indicates that a direct current (DC) is input.
<b>⊕</b> →	Rear panel	The connector that outputs RGB signals and their respective sync signals.
$\hookrightarrow$	Rear panel	The connector that outputs composite video signals from the camera module.
7	Rear panel	The connector to which a remote control signal is input from a remote control unit.
	Rear panel	The button for setting the automatic white balance.
4	Rear panel	The connector that inputs a trigger signal from a flash slave unit. The button for activating the flash when in the flash mode.

# Important safeguards/notices for use in the medical environments

- 1. All equipment connected to this unit shall be certified according to Standard IEC601-1, IEC950, IEC65 or other IEC/ISO Standards applicable to the equipments.
- 2. When this unit is used together with other equipment in the patient area\*, the equipment shall be either powered by an isolation transformer or connected via an additional protective earth terminal to ground the system unless it is certified according to Standard IEC601-1.

#### \*Patient area



3. The leakage current could increase when connected to other equipment.

4. The operator should take care not to touch the rear panel input and output connectors and the patient at the same time.

## **Features**

## High image quality

The DXC-950P 3-CCD color video camera produces high-quality images thanks to its ¹/₂-inch, three-chip Power HAD¹)™ CCD², containing some 380,000 effective picture elements (pixels). The camera has four features that ensure high image quality:

- High horizontal resolution: 750 TV lines
- High sensitivity (defined as minimum required illumination): 2,000 lux at F8.5
- High signal-to-noise ratio: 58 dB
- · Low smear

## Compact and lightweight

The camera is very compact  $(70 \times 72 \times 123.5 \text{ mm})$  and very light (670 g), allowing for easy installation into places where space is a problem.

The following are some examples of application:

- As a permanent fixture in theaters, concert halls, etc.
- As a ceiling camera in halls for special events
- As a camera used in video conference systems
- As a camera for a microscope
- As a roof-top weather monitoring camera
- As a laboratory monitor camera

## **Broad exposure control**

Thanks to the AGC (Automatic Gain Control) and CCD iris control functions, the camera can handle a broad range of subject lighting conditions. When shooting in poor lighting conditions, the AGC feature automatically increases the sensitivity up to eight times. When the amount of light is excessive, the CCD iris control function automatically increases the shutter speed to cut exposure. This function can cut the exposure to the equivalent of up to 6 aperture stops. When using this camera in a fixed location, AGC, CCD iris control and auto-iris control allow for shooting in a broad range of lighting conditions. Combined use of AGC and CCD iris control is also be very helpful when using the camera in a microscope system.

<sup>1)</sup> Power HAD: Power Hole-Accumulated Diode (Power HAD is a registered trademark of Sony.)

#### **Electronic shutter**

The wide range of speeds in the electronic shutter helps you overcome difficult shooting conditions, minimizes blurring in fast-moving subjects, and produces acceptably bright still images of subjects shot in poor light. When set to flickerless mode, the electronic shutter allows you to take flickerless images even under fluorescent light. When you use the electronic shutter in the clear scan mode, you can shoot computer screen displays without horizontal stripes or distortion.

# Useful extensions for building a sophisticated camera system

- The unit outputs four different types of video signals (composite, Y/C, RGB, and component) for connection to various types of video monitors, VCRs, and other video equipment.
- An RM-930 or RM-C950 remote control unit (not supplied) can be connected to the camera.
- Connecting a CCU-M5P camera control unit (not supplied) to the camera will permit image signal transmission over a long cable (up to 300 m [984 feet]).

## **Precautions**

This Sony product has been designed with safety in mind. However, if not used properly, electrical products can cause fires which may lead to serious bodily injury.

To avoid such accidents, be sure to heed the following.

## Heed the safety precautions

Be sure to follow the general safety precautions on pages 4, 5, 9, 10, 11, and in the "Operating Precautions" section on page 12.

#### In case of a breakdown

In case of system breakdown, discontinue use and contact your authorized Sony dealer.

## In case of abnormal operation

- If the unit emits smoke, unusual sounds or smells,
- If water or other foreign objects enter the cabinet, or
- If you drop the unit or damage the cabinet:
- 1 Cut the power supplied to the unit.
- **2** Disconnect the DC power cord.
- **3** Contact your authorized Sony dealer or the store where you purchased the product.

## Safety Precautions The Market State of the Control of the Control

#### Note

To ensure the safe operation of this unit, be sure to heed the following precautions.

#### Do not allow foreign matter to enter the unit

Allowing water or other foreign matter to enter the cabinet may lead to fire. If water or other foreign objects happen to enter the cabinet, switch off the power supplied to the unit, disconnect the DC power cord or connection cables and contact your authorized Sony dealer.

#### Do not dismantle or modify the unit

Disassembly or modification of the unit may lead to fire and/or injury. Leave all adjustments, inspections and repairs of internal components to your authorized Sony dealer.

#### Be sure to install the unit properly

For queries on installation, contact the store where you purchased the product, or contact your authorized Sony dealer.

When attaching the unit to a wall or ceiling, make sure the point of attachment has sufficient strength to support the weight of the unit and mounting bracket. If the point of attachment lacks sufficient strength, the unit may fall, resulting in severe injury. Check the mounting bracket once a year to see that it remains tight.

#### **Precautions**

## Use recommended power supplies

Be sure to use the power supply (camera adaptor) specified in this manual. An unspecified power supply used with this unit may become a fire hazard.

# Use recommended DC cables and connection cables

Use of DC cables and connection cables other than those specified in this manual may lead to fire.

### Take care not to damage cables

Use of damaged DC cables can lead to fires. Take special note of the following:

- Take care not to wedge cables between equipment and racks, walls, etc., during installation.
- Do not modify the DC cables and take care not to damage them.
- Do not place heavy objects on the cables or pull them with excessive force.
- Do not place the cables near heating devices or other heat sources.
- When disconnecting a cable, always pull from the plug; not the cable itself.
- If the DC cables become damaged, discontinue use contact your authorized Sony dealer for a replacement. Continued use of damaged cables may lead to fire.

#### Do not install or operate in environments subject to high levels of smoke, steam, humidity or oil

Operation in any of the above environments may lead to fire. Use of this product in environments other than those specified in this manual may lead to fire.

#### Do not place the unit on an unstable base

The unit may fall, causing physical injury if used in any of the following places:

- On top of a shaky, unstable table
- On inclined surfaces
- In places subject to vibration or shock Check that the place of attachment is strong enough to support the weight of this unit, and that the unit and attachment device are secure.

### Be sure that the lens is screwed on properly

Always be sure that the lens is mounted securely. A loosely attached lens may come loose and fall, resulting in personal injury.

Check to see that the lens remains attached firmly once every year.

# Disconnect the DC cable and connection cables before moving the unit

If the unit is moved with the DC power cable and connection cables still attached, the cables may be damaged, resulting in fire.

#### **Precautions**

## Operating Precautions :

### Operating or storage location

Avoid operating or storing the camera in the following locations:

- Extremely hot or cold places (Operation temperature: -5°C to +45°C [23°F to 113°F])
- In direct sunlight for long periods, or close to heating equipment (e.g., near heaters)
- Close to sources of strong magnetism
- Close to sources of powerful electromagnetic radiation, such as radios or TV transmitters

#### Ventilation

To prevent internal heat buildup, do not block air circulation around the camera.

#### Connections

Do not connect the CCU connector and the \_\_\_ DC IN/ REMOTE connector simultaneously. If they are connected simultaneously, the unit may be damaged.

#### **Transportation**

When transporting the camera, repack it as originally packed at the factory or in materials equal in quality.

#### Cleaning

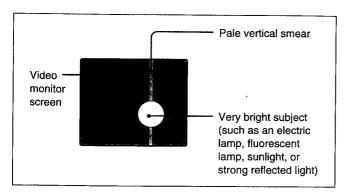
- Use a blower to remove dust from the lens or optical filter.
- Use a soft, dry cloth to clean the external surfaces of the camera. If it is very dirty, use a soft cloth dampened with a small quantity of neutral detergent, then wipe dry.
- Do not use volatile solvents such as alcohol, benzene or thinners as they may damage the surface finish.

## Typical CCD Phenomena

The following phenomena may appear on the monitor screen while you are using the DXC-950P camera. These phenomena stem from the high sensitivity of the CCD image sensors, and do not indicate a fault within the camera.

#### **Vertical smear**

A "smear" may appear to extend vertically from very bright subjects, as shown below.



This phenomenon is common to CCD imaging elements using an interline transfer system, and is caused when an electric charge induced by infrared radiation deep within the photosensor is transferred to the resistors.

#### **Aliasing**

When shooting fine stripes, straight lines or similar patterns, the lines may become slightly jagged.

#### **Blemishes**

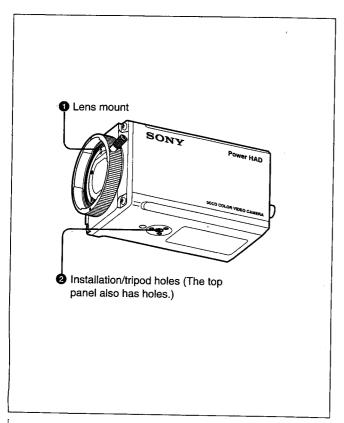
A CCD image sensor consists of an array of individual picture elements (pixels). A malfunctioning sensor element will show up as a single pixel blemish in the image. This is generally not a problem.

#### White speckles

When you shoot a poorly illuminated object at a high temperature, small white dots may appear all over the entire screen image.

# **Location and Function of Parts and Controls**

#### Front Panel/Rook and /Bodon Panels



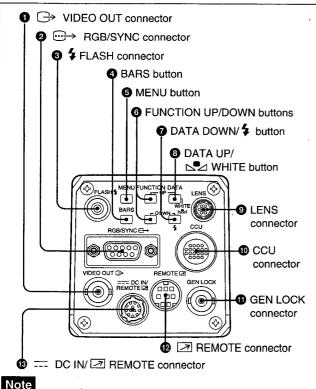
#### 1 Lens mount

Attach a zoom lens or microscope adaptor.

## 2 Installation/tripod holes (top/bottom)

Use these holes when attaching the camera to a wall or ceiling or tripod (screw: 1/4", 20 ridges).

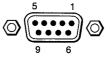
#### **Rear Panel**



Before connecting video equipment, see "Important safeguards/ notices for use in the medical environments" on page 5. • VIDEO OUT (output) connector (BNC-type)
Outputs (composite) video signals from the camera module.

Outputs RGB signals and their respective sync signals. Use a CCXC-9DB/CCXC-9DD/CCMC-9DS cable for the connections.

#### Pin assignment



Pin No.	Signal	Pin No.	Signal
1	GND	6	VBS (Y) output
2	GND	7	SYNC/WEN output
3	RED (R-Y) output	8	GND
4	GREEN (Y) output	9	NC (C output)
5	BLUE (B-Y) output		

## **Location and Function of Parts and Controls**

### **3** FLASH (sync) connector

Connects to a flash slave unit when the camera is in the flash mode.

#### BARS (color bars output) button

Pressing this button for one second outputs the color bars signal. Press again to revert to video signal output. For monitor adjustment, contact your authorized Sony dealer.

#### 6 MENU (menu recall) button

Pressing this button for one second brings up the operational settings menu on the monitor connected to the camera. Press again to hide the menu.

For menu operation, see "Changing the Camera Settings" on page 33.

## 6 FUNCTION UP/DOWN (cursor up/down) buttons

UP button: moves the menu cursor upwards.

**DOWN button:** moves the menu cursor downwards.

## **7** DATA DOWN (setting value reduction)/

#### 4 (flash) button

With the menu displayed: decreases the setting value. With the menu hidden: activates the flash button when in the flash mode.

# **3** DATA UP/ ► WHITE (setting value increase/ white balance adjustment) button

With the menu displayed: increases the setting value. With the menu hidden: activates the automatic white balance adjustment function when the camera is in the Auto mode.

#### **9** LENS connector (6-pin)

Connects to a lens cable when a  $^2/_3$ -inch zoom lens is used. This connector is not used for  $^1/_2$ -inch zoom lenses.

## © CCU (camera control unit) connector (20-pin)

Connects with the CCU-M5P camera control unit (not supplied).

You cannot use the CCU-M5P and the RM-C950 (not supplied) at the same time.

**10** GEN LOCK (reference sync signal input) connector (BNC-type)

Inputs reference sync signals synchronized camera operation.

**12 REMOTE** (remote control) connector (mini-DIN 8-pin)

Connects to an RM-C950 remote control unit (not supplied).

Connects to a CMA-D2CE/D2MDCE camera adaptor (not supplied) or an RM-930 remote control unit (not supplied).

- Use the CMA-D2CE if you are using a DXC-950P for non-medical purposes.
- Use the CMA-D2MDCE if you are using a DXC-950P for medical purposes.

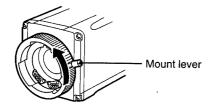
## Installation

#### Mounting the Lens

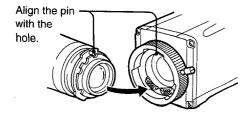
Only <sup>1</sup>/<sub>2</sub>-inch bayonet-mount lenses can be attached to the camera.

For  $^2$ /<sub>3</sub>-inch lenses, an LO-32BMT lens mount adaptor (not supplied) is required.

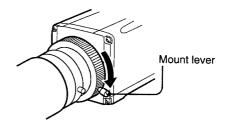
1 Turn the mount lever counterclockwise as far as it goes. (If the lens mount cap is in place, remove it.)



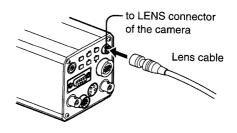
Align the positioning pin on the lens with the matching hole in the lens mount and attach the lens.



3 Turn the mount lever clockwise as far as it goes to lock the lens in the lens mount.



If the lens is a <sup>2</sup>/<sub>3</sub>-inch type, connect the lens cable to the camera's LENS connector.
 (This step in not necessary for <sup>1</sup>/<sub>2</sub>-inch lenses.)



### Mounting a Microscope Adaptor

To attach the camera to a microscope, it is necessary to first mount an appropriate adaptor. The method for mounting these adaptors is the same as for lenses.

For more details, refer to the manual for each adaptor.

#### Mounting on a Tripod -

To mount the camera on a tripod, use the screw hole in the bottom of the camera body.

#### Mounting screw to be used

U1/4", 20 UNC

 $\ell$ : 4.5 ± 0.2 mm (ISO standard)

ℓ: 0.197 inches (ASA standard)



### Attaching to a Wall or Ceiling

To attach the camera on a wall or ceiling, use the appropriate bracket and mounting screws (1/4", 20 ridges). For more details, contact your authorized Sony dealer.

# **Basic System Connection**

To supply power to the camera, use the CMA-D2CE/D2MDCE camera adaptor (not supplied).

There are two connection methods, one using a CCDC cable and the other using a CCMC cable. The CCDC cable only supplies power to the camera. The CCMC cable supplies power to the camera and transmits video signals from the camera back to the camera adaptor.

#### Power supply

Use only with the following camera adaptor or camera control unit according to the use.

Camera adaptor	or camera control unit
For medical use	For non-medical use
CMA-D2MDCE	CMA-D2CE CCU-M5P

For more details, contact your Sony dealer.

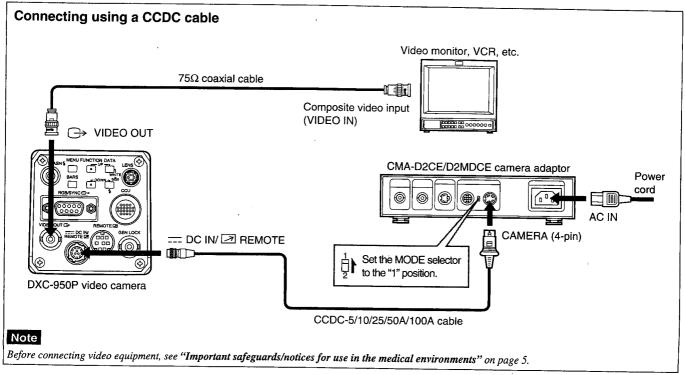
#### Note on use of camera adaptors

Although the CMA-D2CE/D2MDCE camera adaptor has two CAMERA connectors (4-pin and 12-pin), the power consumption of the DXC-950P is such that two camera units cannot be connected at the same time. Be sure to use one camera adaptor for each DXC-950P unit.

#### Note on connections

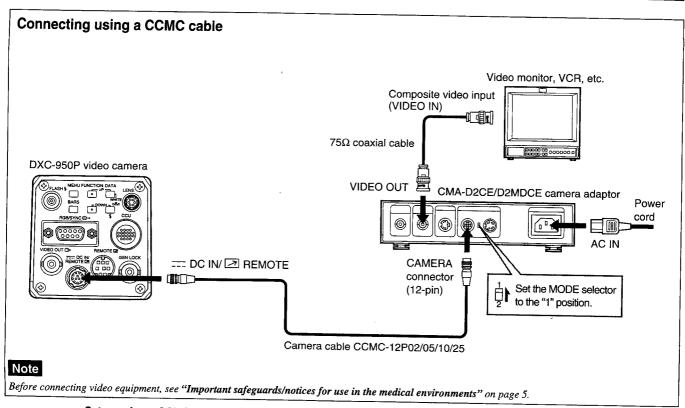
Be sure to turn off power supply for all equipment before making any connections.

## Connecting to Video Equipment With Composite Video Input Connectors



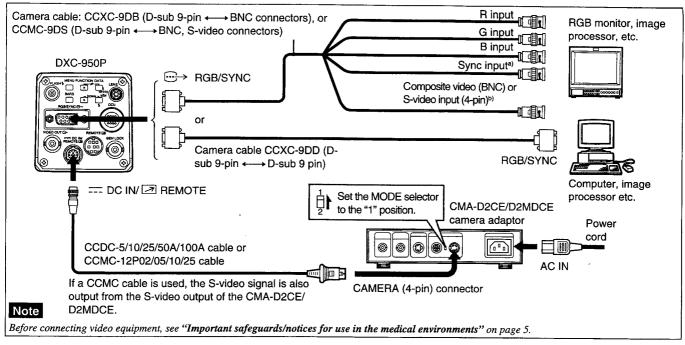
Setup using a CCDC cable (for supplying power only)

### **Basic System Connection**



Setup using a CCMC cable (for supplying power to cameras and video signals to the camera adapter)

#### Connecting to Video Equipment With RGB or S-Video Inputs



 a) When using a video monitor without a sync signal input connector, the camera can be set to output a sync signal with the G signal (G.SYNC).

For details, see page 44.

b) This setup is for connecting to a composite video (VBS) connector. To send separated Y/C signals to the S-video input of video equipment, use a CCMC-9DS camera cable.

For details on switching camera output between VBS (composite video) and Y/C, see page 45.

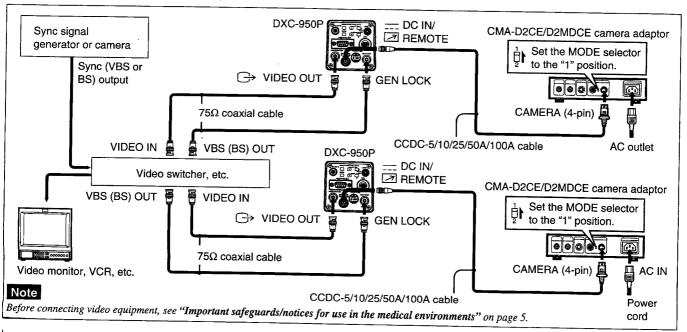
## Connections for a Multi-Camera System

#### Notes on multi-camera systems

Take the following steps to prevent flicker when switching between two or more cameras connected to a video switcher:

• Supply the same sync signal to the GEN LOCK connectors on each camera (see below).

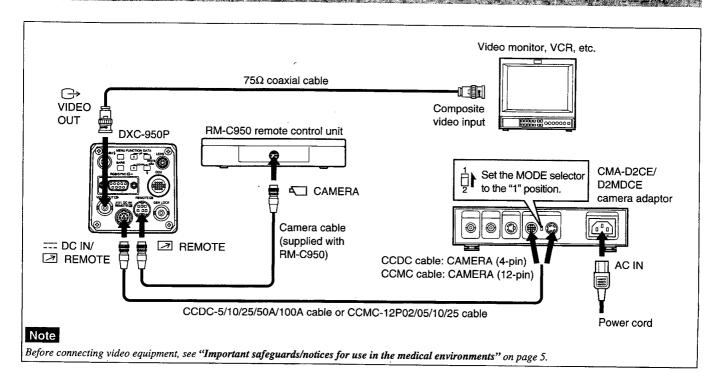
- Adjust the subcarrier and horizontal synchronization phases for all cameras.
   For more details see "Adjusting the Picture Tone in
- For more details, see "Adjusting the Picture Tone in a Multi-Camera System" on page 52.



## **Connecting to a Remote Control Unit**

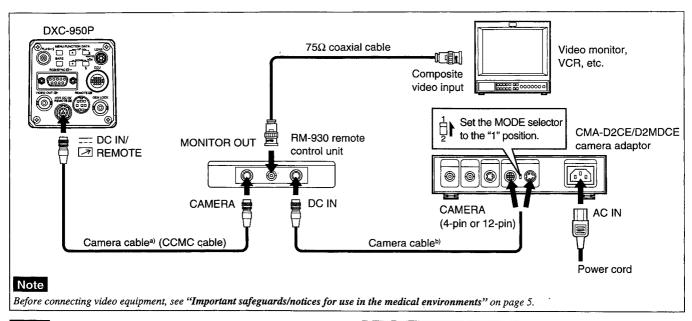
You can connect a remote control unit (the RM-930 or RM-C950) to the camera module.

#### Connecting to the RM-C950 Remote Control Unit



#### **Connecting to a Remote Control Unit**

## Connecting to the RM-930 Remote Control Unit

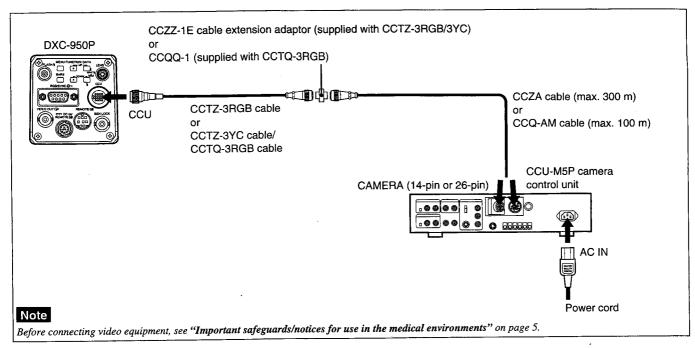


#### Notes

- When using the RM-930, use the camera cables as shown in the table on the right.
- When using the MONITOR OUT connector of the RM-930, set D-sub out to VBS on the on-screen menu.

Camera cable <sup>a)</sup>	Camera cable <sup>b)</sup>
CCMC-12P02/05/10	CCMC-12P02/05/10/25 CCDC-5/10/25/50A
CCMC-12P25	CCMC-12P02/05/10 CCDC-5/10/25/50A

# Connecting to a Camera Control Unit



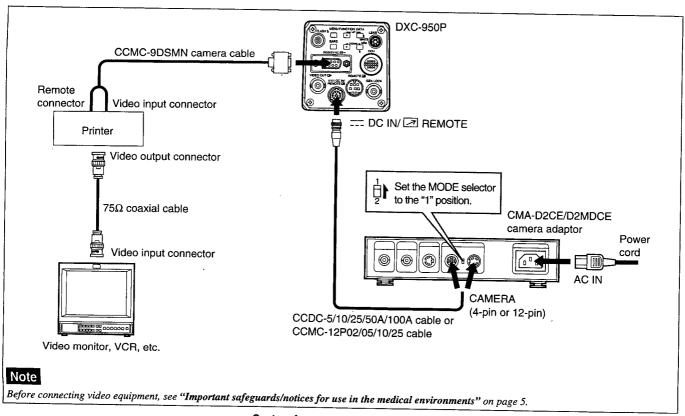
#### Note

Never connect a CCU-M5P camera control unit and a CMA-D2CE/D2MDCE camera adaptor/RM-930 remote control at the same time; doing so could damage the equipment.

#### Setting functions not available in the CCU-M5

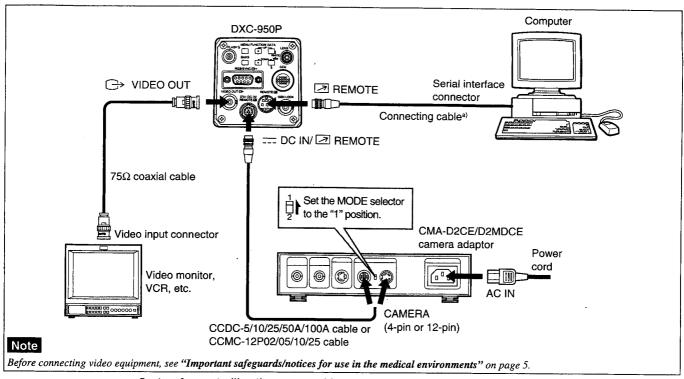
Switch on the power to the CCU while pressing the FUNCTION UP button on the camera. This will allow you to make settings in the camera menu. After you have made the settings, switch the CCU off and then back on again. You will then be able to control the camera from the CCU.

# Connecting to a Printer



System for connecting to a printer

# **Connecting to a Computer**



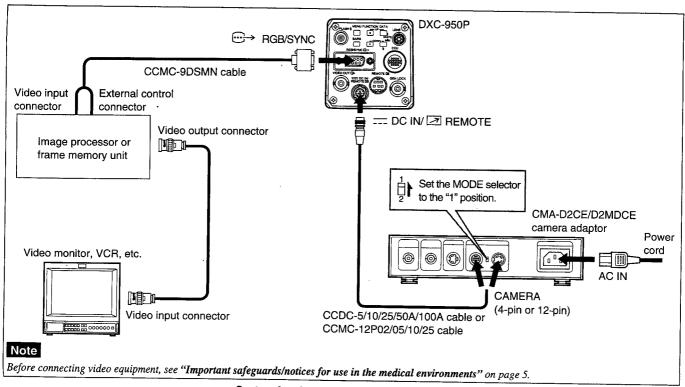
System for controlling the camera with a computer using an RS-232C command

a) Always use a specified shielded cable when connecting the unit to a computer.

#### Note

For more details on RS-232C protocols and cables for connection to a computer, contact your authorized Sony dealer.

# **Connections for Long Exposure Shooting**



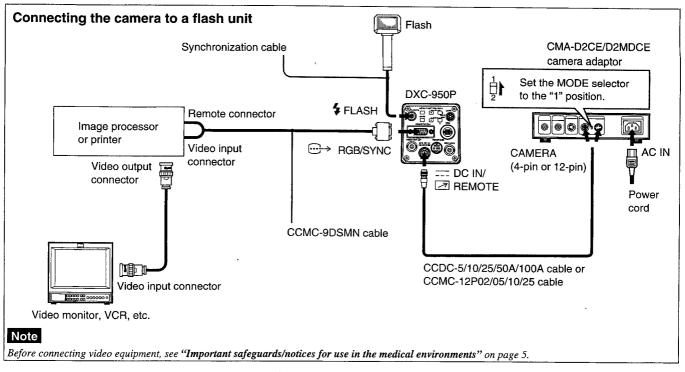
System for shooting using long exposure

#### Note

When shooting with long exposure, make the following adjustments:

Sync/w.en → w.en (See page 40) G sync → on (if you are using RGB OUT) (See page 44)

## Connecting to a Flash Unit

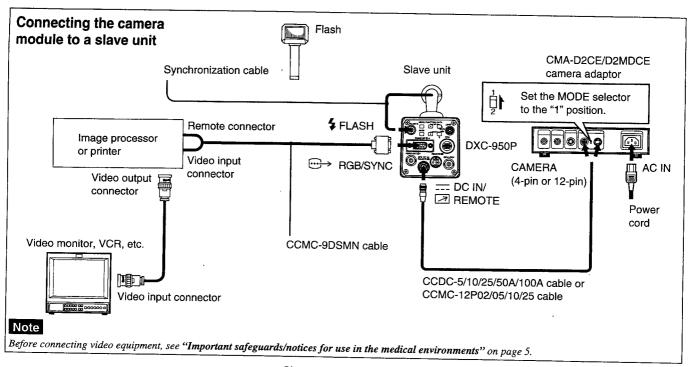


Master mode connection

#### Note

Only a limited selection of printers may be connected to the DXC-950P. For details, connect your authorized Sony dealer.

## Connecting to a Flash Unit



Slave mode connection

#### Note

Only a limited selection of printers are directly compatible with the DXC-950P. For details, connect your authorized Sony dealer.

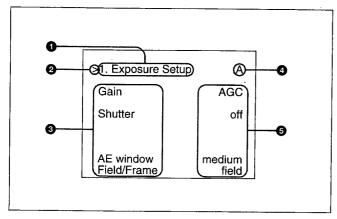
## Changing the Camera Settings

Camera operational settings can be changed through simple adjustment of the settings on the on-screen menus. Settings can be adjusted to get the best possible results for the given shooting conditions or to enhance the image with special effects.

There are four menu pages.

#### To display the menu

Press and hold down the MENU button for one second. The menu is displayed on the screen.



Menu

#### 1 Menu page

Displays the selected menu page.

Menu page	Settings	
1. Exposure Setup (page 1)	Exposure-related items, such as gain and shutter	
2. Color Setup (page 2)	Color-related items, such as white balance	
3. General Setup (page 3)	General items	
4. System Setup (page 4)	System items, such as memory and output signals	

#### 2 Cursor

Selects an item. Move the cursor up/down using the FUNCTION UP/DOWN buttons.

#### **3** Settings items

Scroll through the items to be set with the FUNCTION UP/DOWN buttons.

#### **4** Settings memory

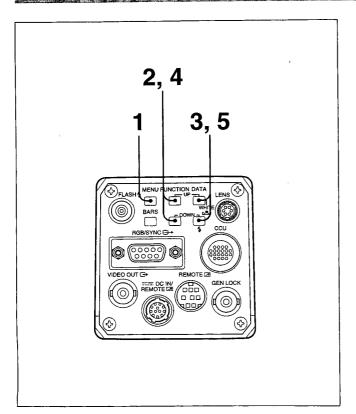
Indicates the settings memory bank (A or B). Flashes if "Mem.Protect" has been set to on.

For more details, see "Menu Settings" on page 44.

#### **6** Settings values

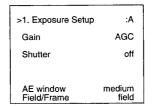
Change the values using the DATA UP/DOWN buttons.

## Ment Operation (Changing the Settings

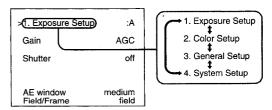


The settings on the menu can be changed as follows:

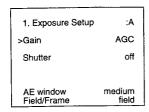
1 Press and hold down the MENU button for one second. The menu page that was selected last is displayed on the monitor screen.



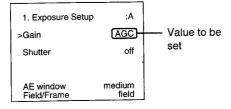
- **2** Press the FUNCTION UP button to bring the cursor to the first line.
- **3** Press the DATA UP or DOWN button to select a page.



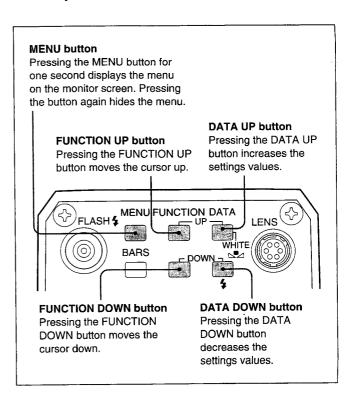
4 Press the FUNCTION UP or DOWN button to select the item to be set.



5 Press the DATA UP or DOWN button to change the value.

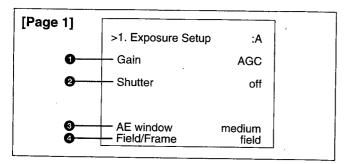


#### Menu operation buttons

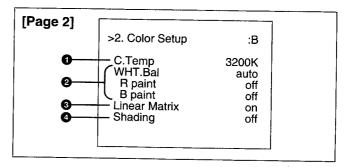


## **Changing the Camera Settings**

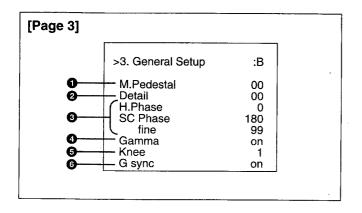
#### Menungas



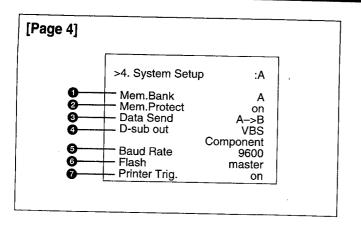
Menu Item	Function	Page No.
<b>❶</b> Gain	Adjusts the video gain.	39
2 Shutter	Sets the electronic shutter, the long-term accumulation and the CCD Iris.	39
AE window	Selects the AE window when in the AGC, CCD iris or auto iris modes.	41
4 Field/Frame	Switches between frame accumulation and field accumulation.	41



Menu Item	Function	Page No.
1 C.Temp	Selects 3200K or 5600K in accordance with the lighting conditions.	42
<b>②</b> WHT.Bal	Selects the white balance settings (auto/manual/auto tracing).	42
3 Linear Matrix	Rectifies color balance through application of a linear matrix.	42
<b>₫</b> Shading	Rectifies shading.	42



Menu Item	Function	Page No.
M.Pedestal	Synchronizes the output signal pedestal with the RGB signal.	43
② Detail	Adjusts the outline emphasis.	43
SC Phase/ SC Phase/ SC fine	Adjusts the difference in phase of the subcarrier and the horizontal synchronization during external synchronization.  Note  When there is no synchronization, H.Phase, SC Phase and SC fine cannot be set, and "" appears.	43
4 Gamma	Compensates gamma (on/off).	44
<b>6</b> Knee	Selects image compression characteristics when shooting very bright objects.	44
<b>6</b> G sync	Adds a sync signal to the G (green) channel of the RGB output.	44



Menu Item	Function	Page No.
Mem.Bank	Selects memory bank A or B.	44
Mem.     Protect	Protects memory bank A or B.	44
Data Send	Copies settings values form memory A → B or B → A.	45
D-sub out	Selects VBS or Y/C, RGB or component output.	45
Baud Rate	Selects the baud rate (RS-232C baud rate).	45
6 Flash	Selects the flash mode (master/ slave).	45
Printer Trig.	Triggers a printer.	46

### Menu Settings

### 1. Exposure Setup menu (page 1)

### Gain [AGC/step/ISO]

Adjusts video gain.

AGC	Automatic gain control. Automatically adjusts the gain of the video signal in accordance with the brightness of the subject. This function is useful for shooting subjects under changing lighting conditions.
step	Sets the video gain to manual control. Use this function for shooting in extremely dark places where even fully opening the lens iris still does not produce an acceptably bright image. The gain level can be set in the range of 0 to 18 dB in units of 1 dB.
ISO	Sets the video gain to the desired level in the ISO sensitivity display (frame mode). The gain level can be set to 400, 800, or 1600. In the field mode, the real value is twice the displayed value. When used with a still-image camera (for example, a single-lens reflex camera), this item serves as a reference for approximate exposure settings. For greater accuracy, check the exposure level with an exposure meter as this value may change depending on the lighting conditions.

#### Shutter [off/long exp/step/c.scan/CCD-IRIS]

The electronic shutter allows for blur-free images of fastmoving subjects and, if used in combination with the frame memory, produces good still images of subjects shot in poor lighting conditions.

#### Note

If you are using the Shutter, be sure to set "Flash" to "off."

off	Deactivates the electronic shutter.
long exp	Sets the shutter speed in units of 1 frame.  Range: Field mode: 1 – 255 FRM (frames) Frame mode: 2 – 256 FRM (frames)  For more details on field and frame modes, see page 41.  For example, if the value is set to 050 frames (about 2.0 seconds in the PAL format), the total amount of video signals accumulated during this set time is output in the form of one complete field (or one still frame) at intervals of about 2.0 seconds. These pictures, which contain 50 frames of video information, are much brighter than normal one-frame images. This mode of setting the shutter speed is very useful for shooting a poorly illuminated subject in a dark place. The WEN (timing) video signals can be output from the RGB/SYNC connector at the back of the unit. This function synchronizes an external frame memory with the timing pulse to allow for image processing or image analysis.  Shutter speed calculation  Example: Shutter speed when unit set at 005 frames:
	$005 \times 1/25 = 0.2$ seconds (continues)

long exp	boos	ter [on/off]
(cont.)	When camera is in the "long exp" mode, this function lets you to set the focus or color for subjects in poor lighting conditions by allowing 4 FRM (frames) accumulation and gain adjustment. In such situations, set "booster" to on, set the focus and color, and then turn it off. You can then shoot in the long exposure mode.  sync/w.en [sync/w.en] This function lets you change the output from the RGB/SYNC connector on the rear panel. It is	
sync Outputs a composite sync s		Outputs a composite sync signal. This is the normal setting.
	w.en	Outputs a WEN (timing) pulse. Use this function to synchronize a connected frame memory.
• When the camera is set to "long exp', AGC, C AUTO IRIS (located on remote control unit) of used. When in the "long exp" mode, use the G "step" or "ISO" and set the IRIS to MANUAL • Set the G. sync to ON when using the RGB ou		n the camera is set to "long exp', AGC, CCD IRIS, TO IRIS (located on remote control unit) cannot be When in the "long exp" mode, use the GAIN in "or "ISO" and set the IRIS to MANUAL. The G. sync to ON when using the RGB output. function is enabled only when both "Flash" and
step	1/4000 60 Hz I	e shutter to one of the following eight speeds: kerless), 1/125, 1/250, 1/500, 1/1000, 1/2000, , or 1/10000. When using the DXC-950P with ighting power, setting the shutter to FL gives kerless images even under fluorescent light.

#### c.scan

Sets the shutter speed in units of 1 H (horizontal scanning time; 64 µs). The shutter speed can be set to anywhere between 1/625 – 310/625 H. The setting is made in units of 1 H. This setting can be used to reduce noise (horizontal patterns) when shooting a computer screen. To find the most appropriate setting, use the DATA UP/DOWN buttons to change the setting while observing the noise on a monitoring screen.

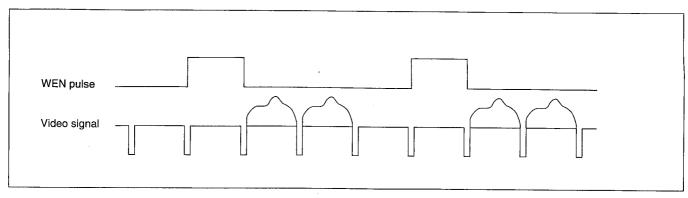
#### Shutter speed calculation

**Example:** Shutter speed in 250/625 (H)  $250 \times 64~\mu s$  (1 H) + 35.6  $\mu s$  (constant) = 16035.6  $\mu s$  = about 0.016 seconds

#### **CCD-IRIS**

When an excessive amount of light passes through the lens, this function increases the shutter speed to cut exposure to the equivalent of up to 6 aperture stops. The function is useful for microscope applications where lighting that is just right for the human eye often is too bright for the video camera. When CCD-IRIS is set to ON, the excessive incident light is automatically decreased to an appropriate level for the video camera. The CCD iris function is also useful for cutting out excess incident light that is not cut out by the auto-iris lens in scenes containing very bright patches (such as snow, or sea water reflecting sunlight).

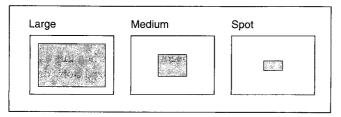
You can use CCD-IRIS in combination with AGC, and/ or auto-iris control.



Timing chart in long exp. mode of the electronic shutter (2 FRM)

### AE window [large/medium/spot]

The AE (auto exposure) window comes in three different sizes and is used together with the AGC, CCD iris and auto-iris lens.



**AE** windows

### Field/Frame [field/frame]

Selects frame accumulation or field accumulation

Science 1	Table accumulation of field accumulation.
field	Eliminates blur when shooting fast-moving subjects. The CCD accumulates charges by field units to make images show a minimum of blur even when the subject is moving fast.
frame	Produces images with the highest possible vertical resolution. In this mode, the CCD changes the line that reads the signal for each field and accumulates charges in frame units. Select this setting when using the camera together with measuring instruments that feature memory functions, systems with image-processing or analysis functions or a still-image processing system.  Note  If you are using a booster, the "field/frame" item remains fixed on "frame."

### 2. Color Setup menu (page 2)

#### C.Temp (color temperature) [3200K/5600K]

Selects the color temperature accordance to the lighting.

3200K	Use for indoor shooting.
5600K	Use for outdoor shooting.

#### WHT.Bal (white balance) [auto/manu/ATW]

Selects the white balance settings.

auto	Use for a	Use for automatic adjustment of the white balance.	
manu	1	Use for manual adjustment of white balance. Both red gain (R gain) and blue gain (B gain) are adjustable.	
	R gain	Adjusts the red gain (-99 to +99).	
	B gain	Adjusts the blue gain (-99 to +99).	
ATW	suitable v balance i	Activates the auto-tracing white balance. This mode is suitable when the light source changes. The white balance is automatically adjusted as the color temperature changes.	

ATW	adjust the the "R pa	dal" is set to auto or ATW, use this to fine white balance. If auto or ATW is selected, int" and "B paint" values are displayed on the just these while looking at the screen.
	R paint	Adjusts the red paint (-7 to +7).
	B paint	Adjusts the blue paint (-7 to +7).

#### Linear Matrix [on/off]

When in the ON position, images are processed with a color matrix to produce natural colors.

on	Colors adjusted to natural colors.
off	Colors not adjusted. (Use when you want to process the picture.)

#### Shading [off/1 to 99]

If the camera unit is attached to a microscope, a green color may appear at the top of the screen while a magenta color may appear at the bottom. To eliminate these colors, use the Shading (1 to 99) function. Adjust the colors while looking at the screen. If the colors become darker when this function is turned off, contact your authorized Sony dealer.

### 3. General Setup menu (page 3)

### M.Pedestal [-99 to +99]

Adjusts the darkness level of the black parts of the image. Use this function to bring out details of heavily shaded areas. Use of a waveform monitor will make the adjustment easier. Normally set to 0.

+	Lighter
_	Darker

#### Detail [-99 to +99]

Adjusts the sharpness of the object outlines of an image.

+	Sharper with more detail on the image outline.
_	Softer with less detail.

#### H.Phase [-99 to +99]

When an external reference sync signal for locking the camera sync generator is input to the GEN LOCK connector on the rear panel, the camera operates at the frequency of the reference signal. You can use the H.Phase function to perfectly synchronize the camera operation with the reference signal to the level of the horizontal phase.

#### Note

If there is not an external sync signal, no value is displayed.

#### SC Phase [0/180], (SC)fine [-99 to +99]

When locking the camera sync generator, use the SC Phase function to adjust the subcarrier phase. First set to between 0° and 180° for rough adjustment, then use (SC)fine for fine adjustment.

#### Note

If there is no external sync signal, no value is displayed.

### Gamma [on/off]

Compensates gamma.

on	Compensates the reproduction characteristics of the screen to produce natural-tone images. Use this setting for normal camera use.
off	Outputs the video signal linearly from the CCD without gamma compensation. Use this setting when you want to produce images for image processing or image analysis.

### Knee [1/2]

The two following knee positions are available:

1	Used in normal shooting conditions.
2	Used when shooting a dark object and a highly illuminated object at the same time.

### G sync [on/off]

Adds a sync signal to the G signal in the RGB output.

on	Select when using a video monitor without a sync input connector. A sync-added G signal can be output from the camera's $\longrightarrow$ RGB/SYNC connector (rear panel).
off	A sync signal is not added to the G output signal.

### 4. System Setup menu (page 4)

#### Mem.Bank [A/B]

This camera has two memory banks (A or B) for storing settings. You can record a different group of settings in each bank, and switch to the bank most suitable for the shooting conditions at hand. The selected memory bank is shown in the upper left corner of the menu.

### Mem.Protect [on/off]

You can protect each memory bank by setting "Mem.Protect" to on. If the memory bank is protected, the memory bank (A or B) indicator in the upper left corner of the menu flashes. Note that the following items can be changed even when a memory bank is protected.

Page 1: "Gain", "Shutter"

Page 2: "C.Temp", "WHT.Bal"

Page 4: "Mem.Bank", "Mem.Protect", "Data Send"

### Data Send [A -> B/B -> A]

The camera settings can be copied between the two memory banks.

### How to copy

The following is an example for copying the settings in memory bank A to memory bank B:

- 1 Select A -> B in the menu.
- **2** Press the MENU button and erase the menu.
- 3 Press the DATA UP button and the DATA DOWN buttons at the same time.

If you save (and protect) the master settings in memory bank A, you can use them later when resetting memory bank B. To activate the copied settings, switch to a different memory bank (Mem. Bank A or B)

#### D-sub out [VBS/YC, RGB/Comp]

This allows you to select the output signal format.

VBS	Changes the output of the → RGB/SYNC connector and the → DC IN/ REMOTE connector (when using a CMA-D2CE/D2MDCE) to VBS output.
YC	Changes the output of the → RGB/SYNC connector and the → DC IN/  REMOTE connector (when using a CMA-D2CE/D2MDCE) to Y/C output.
RGB	Changes the output of the → RGB/SYNC connector and the CCU connector to RGB output.
Comp	Changes the output of the

#### Baud Rate [9600/4800/2400/1200]

Changes the baud rate of the REMOTE connector.
Use a baud rate of 9600 when an RM-C950 is connected.

### Flash [off/master/slave]

Select this mode when using a flash. If you connect to a printer or external frame memory and synchronize it with a WEN pulse, you can shoot the image at the time of the flash. The WEN pulse is output from the RGB/SYNC  $\longrightarrow$  connector.

master	You can connect a flash unit to the FLASH connector. Pressing the FLASH button outputs a WEN pulse, and a flash is emitted.
slave	You can connect a slave unit to the \$\frac{1}{2}\$ FLASH connector. The slave unit detects the flash and a WEN pulse is output.

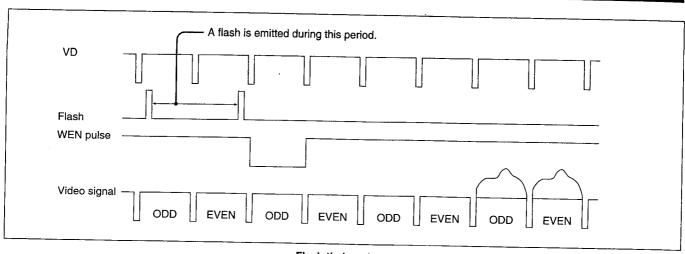
For connecting a flash unit or a slave unit, see "Connecting to a Flash Unit" on page 31.

#### Notes

- The camera enters frame accumulation mode and the color temperature is set to 5600K when in the flash mode. The electronic shutter cannot be used in accumulation mode.
- If you increase the gain on the "1. Exposure Setup" menu (page 1), the level becomes 0 dB as soon as the flash goes off. For details, see the "Flash timing chart" on page 46.
- When in the flash mode, the RGB/SYNC connector automatically switches to the following settings:

$$\begin{array}{ccc} SYNC & \longrightarrow & WEN \\ G \text{ sync} & \longrightarrow & ON \end{array}$$

If you set the flash mode to OFF, the G sync will remain set to ON.



Flash timing chart

### Printer Trig. [on/off]

You can connect a printer to the camera unit and send images to the printer (memory-in) for printing.

Set Printer Trig. to on and input an external timing pulse from the RGB/SYNC connector to the printer. When you press the FLASH button, the image is sent to the printer memory, or the image is printed out from the printer. Set the printer to store or print the image.

For more details, see "Connecting to a Printer" on page 28.

#### Note

• When in the Printer Trig. mode, the RGB/SYNC connector automatically switches to the following settings:

 $\begin{array}{ccc} SYNC & \longrightarrow & WEN \\ G sync & \longrightarrow & ON \end{array}$ 

If you set the Printer Trig. mode to OFF, the G sync will remain set to ON.

• You cannot use the "flash" and the "printer" functions at the same time. The menu is set up so that only one can be selected at any one time.

For details on the printer settings, see the operation manual for the printer

### Initial Settines

To revert each item to its original setting, press the DATA UP and DATA DOWN buttons at the same time.

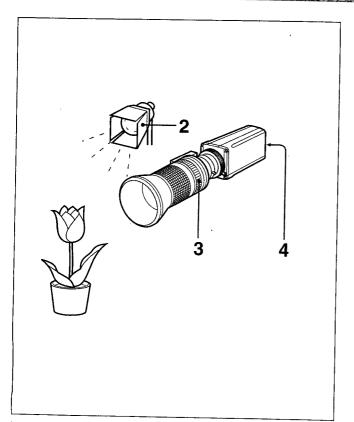
Menu Page	Item	Initial setting
Exposure     Setup	Gain	step, 0 dB (ISO, 400)
	Shutter	off (long exp, off) (booster, off) (sync/w.en, sync) (step, FL) (c.scan, 310/625)
	AE window	large
	Field/Frame	field
2. Color Setup	C.Temp	3200K
	WHT.Bal	auto (R paint, off) (G paint, off) (R gain, 0) (G gain, 0)
	Linear Matrix	on
	Shading	off

Menu Page	Item	Initial setting
3. General Setup	M.Pedestal	00
	Detail	00
	H.Phase SC Phase (SC)fine	00a) 00a)
	Gamma	on
	Knee	1
	G sync	on
4. System Setup	Mem.Bank	Α
Setuh	Mem.Protect	off
	Data Send	A -> B
	D-sub out	VBS RGB
	Baud Rate	9600
	Flash	off
	Printer Trig.	off

a) If there is no external sync signal, "--" is shown.

# **Shooting**

### Easio Sheether Proceeding

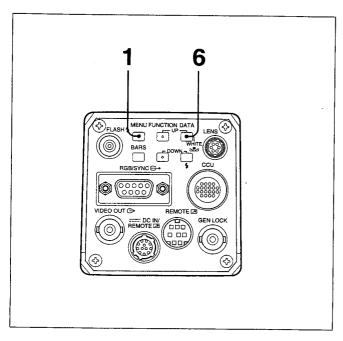


- 1 Turn on the power of the camera and all connected devices.
- 2 Illuminate the subject with proper lighting.
- **3** Aim the camera and adjust the iris, focus and zoom.
- **4** Adjust the white balance. For more details, see "Adjusting the White Balance" on page 49.
- Adjust the settings as needed.

  For more details, see "Changing the Camera Settings" on page 33.
- 6 Start shooting.

### Adjusting the White Balance

Each time the lighting conditions change, adjust the white balance so that optimal color reproduction is obtained.



### Adjusting the white balance

- 1 Press the MENU button for one second. (The menu is displayed.)
- **2** Choose "2. Color Setup" and make the following settings for color temperature and white balance. See "Menu Operation (Changing the Settings)" on page 34.

C.Temp: 3200K or 5600K (depending on the

lighting conditions)

WHT.Bal: auto

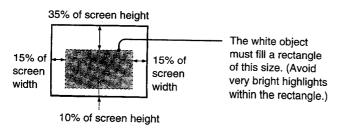
2. Color Setup	:В
>C.Temp WHT.Bal R paint B paint Linear Matrix Shading	3200K auto off off on off

### **Shooting**

3 Display the camera image on the screen.

#### Notes

- If the color bar signal is displayed on the screen, press the BARS button to make it disappear.
- If the menu is displayed on the screen, press the MENU button to make it disappear.
- 4 Set the lens iris control as follows:
  - Set to auto-iris control when using a lens with autoiris capability.
  - Set to an appropriate iris opening value when using a manual-iris lens.
- Place a white object in the same light as that falling on the subject to be shot, then zoom in on the object to fill the screen as follows:



The white object can be a piece of white paper or cloth, a white wall, or the like.

#### Notes

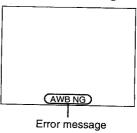
- Be careful not to include highly reflective items in the picture.
- Always shoot the image under suitable lighting conditions.
- Press the WHITE button for one second.

  The message "AWB" appears on the screen while the white level is being adjusted. When the adjustment is done, the message "AWB OK" flashes on the screen. The adjusted white level is automatically stored in memory where it remains for at least 10 years, even if the camera's power is turned off.

#### White balance adjustment errors

If the white balance adjustment is not successful, an error message appears on the screen for about one second. If this happens, take the necessary measures and conduct steps 1 through 6 again.

For more details, see "Error messages" on page 51.



### **Error messages**

Error message	Description and remedy
AWB NG too Dark	The video signal level is too low.  Take one or more of the following measures and then press the
AWB NG too Bright	The video signal level is too high.  Take one or more of the following measures and then press the WHITE button again.  Remove any brightly illuminated objects.  Decrease the illumination.  Close the iris opening.  Decrease the video gain.
AWB NG C.Temp Low	The color temperature is too low. Change the C.Temp setting in the menu to 3200K and try again.
AWB NG C.Temp High	The color temperature is too high. Change the C.Temp setting in the menu to 5600K and try again.

Error message	Description and remedy
AWB NG	The camera has failed to adjust the white balance. Take one or both of the following measures and then try again.  • Remove very bright highlights from the screen.  • Adjust the illumination.  If this message appears repeatedly, have the internal circuitry checked by qualified personnel.

## Adjusting the Picture Tone in a Multi-Camera System

When configuring a multi-camera system, adjust all cameras to prevent camera-to-camera variations in picture tone. Before making the adjustments outlined below, supply the same sync signal to all cameras.

For more details, see "Connections for a Multi-Camera System" on page 24.

# Connecting the cameras to video equipment with phase indication capability

When connecting to a special-effects generator, a chromakey unit, or other video equipment with phase indication capability, the basic adjustment procedure is as follows:

- 1 Turn on the phase indication capability of the connected video equipment.
- Adjust the horizontal phase using the "H.Phase" function on the "3. General Setup" menu (page 3). For more details, see page 43.
- Adjust the subcarrier phase using the "H.Phase" function on the "3. General Setup" menu (page 3). First set to between 0° and 180° for rough adjustment, then use "(SC)fine". For more details, see page 43.

For more details, refer to the instruction manual of the connected video equipment with phase indication capability.

# Connecting the cameras to video equipment without phase indication capability

Use one of the cameras as a reference camera and adjust the other cameras to the reference camera one by one.

- Adjust the horizontal phase. Using the "H. Phase" function on the "3. General Setup" menu (page 3), adjust so the reference video signal and the output signal have the same horizontal sync phase. Use a waveform monitor or an oscilloscope to check the phase.
- Adjust the SC phase. First set to between 0° and 180° for rough adjustment, then use "(SC)fine" for fine adjustment so that the reference video signal and the output video signal have the same subcarrier phase. Use a vectorscope or the wiping function of a special-effects generator so that the images of both the reference camera and the camera to be adjusted appear next to each other on the screen.

# **Specifications**

### Imaging system/optical system

Pickup device <sup>1</sup>/<sub>2</sub>-inch CCD, interline transfer

type

Effective picture elements 752 (horizontal)  $\times$  582 (vertical)

Lens mount <sup>1</sup>/<sub>2</sub>-inch bayonet type

### Video system

Synchronization Internal/external (VBS)

synchronization, automatic

switching

Signal format Horizontal scanning Scanning frequency

PAL

625 lines, 2:1 interlace Horizontal: 15.625 kHz

Vertical: 50 Hz

### **Functions/performance**

Horizontal resolution

Sensitivity

Signal-to-noise ratio

Gain control

750 TV lines

2,000 lux (F8.5, 3200K)

58 dB

Automatic

• Manual: 0 - 18 dB in units of 1 dB

· ISO display

White balancing

Automatic

 Manual: Red gain and green gain adjustable individually

• ATW

Linear matrix Electronic shutter speed

On/off switchable Adjustable in the range of

1/10,000 to about 10 seconds (Usable with CCD IRIS)

On/off switchable

Gamma compensation Charge accumulation mode

> Switchable between field and frame modes

### Inputs/outputs

Output signals Video Composite: 1.0 Vp-p, 75 ohms RGB: 0.7 Vp-p, 75 ohm Y/R-Y/B-Y: 1.0 Vp-p/0.525 Vp-p/0.525 Vp-p, 75 ohms Y/C: 1.0 Vp-p, same level as VBS chroma, 75 ohms Sync: 2.0 Vp-p, 75 ohms External sync input VBS/BS (VBS 1.0 Vp-p or burst 0.3 Vp-p, SYNC 0.3 Vp-p) Input/output connectors VIDEO OUT: BNC, 75 ohms. unbalanced GEN LOCK: BNC, 75 ohms, unbalanced DC IN/REMOTE: 12-pin REMOTE: mini-DIN 8-pin FLASH: Sync socket RGB/SYNC: D-Sub 9-pin LENS: 6-pin connector for <sup>2</sup>/<sub>3</sub>-inch lens CCU: 20-pin

#### **Miscellaneous**

Power supply 12 V DC Power consumption 8.2 W Operating temperature -5 to +45°C (23 to 113°F) Transport/storage temperature  $-20 \text{ to } +60^{\circ}\text{C} (-4 \text{ to } +140^{\circ}\text{F})$ Operating humidity 20% to 80% (no condensation allowed) Transport/storage humidity 20% to 90% (no condensation allowed) Dimensions (w/h/d)  $70 \times 72 \times 123.5 \text{ mm}$  $(2^{7}/_{8} \times 2^{7}/_{8} \times 4^{7}/_{8} \text{ inches})$ Mass About 670 g (1 lb 8 oz) Supplied accessories Lens mount cap (1)

Design and specifications are subject to change without notice.

Instructions for Use (1)

## Recommended Equipment

#### Lenses

VCL-707BXM (automatic zoom, 7×)

VCL-712BXEA (automatic zoom, 12×)

VCL-716BXEA (automatic zoom, 16×)

### Camera adaptor

CMA-D2CE/D2MDCE camera adaptor

#### Camera control unit

CCU-M5P camera control unit

### Remote control unit

RM-930 remote control unit (CCMC cable supplied) RM-C950 remote control unit (connection cable supplied)

### Microscope adaptors and couplers

MVA-40 microscope adaptor (with automatic dimmer) MVA-41A microscope adaptor MVA-265 microscope adaptor (with automatic dimmer) MVAC-33-O microscope coupler (for Olympus microscopes) MVAC-33-N microscope coupler (for Nikon microscopes) MVAC-33-SM microscope coupler (for Nikon microscopes)

### Lens mount adaptor

LO-32BMT lens mount adaptor

### Power supply cables

CCDC series (length: 5 m [16 ft], 10 m [32 ft], or 25 m [82 ft]) CCDCA series (length: 50 m [164 ft], or 100 m [328 ft]) CCMC series (length: 2 m [7 ft], 5 m [16 ft], 10 m [32 ft], or 25 m [82 ft])

### **CCU** connection cables

CCTZ-3RGB (for RGB output, with CCZZ-1E extension connector, length 3 m [9 ft 10 in])

CCTZ-3YC (for Y/C output, with CCZZ-1E extension connector, length 3 m [9 ft 10 in])

CCTQ-3RGB (for RGB output, with CCQQ-1 extension connector, length 3 m [9 ft 10 in])

### **Extension cables for CCU connection**

CCZA (max. length: 300 m [984 ft]) CCQ-AM (max. length 100 m [328 ft])

### Camera cables

CCXC-9DB (D-sub  $\longleftrightarrow$  BNC  $\times$  5)

 $CCXC-9DD (D-sub \longleftrightarrow D-sub)$ 

CCMC-9DS (D-sub ←→ BNC × 4, S-video connector)

CCMC-9DSMN (D-sub ←→ BNC × 3, phono jack, S-video connector)

If you have any questions about this unit, cantact your authorized Sony dealer or the following:

Sollten Sie weiter Fragen haben, wenden Sie sich bitte an Ihren Sony-Händler oder an folgende Adresse:

BROADCAST and PROFESSIONAL Europe (BPE) Sony Deutschland G.m.b.H. Hugo-Eckener Strasse 20, 50829 köln, Germany Tel: (0221) 5966-0

Fax: (0221) 5966-349

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